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	SHEET	1	2	3	4	5	6	7	8										
PMIC N/A	PREPARED BY <i>Charles E. Besore</i>								DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444										
STANDARDIZED MILITARY DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	CHECKED BY <i>Wm Johnson</i>								MICROCIRCUIT, LINEAR, DUAL, LOW-NOISE, OPERATIONAL AMPLIFIERS, MONOLITHIC SILICON										
	APPROVED BY <i>[Signature]</i>								SIZE A		CAGE CODE 67268		5962-88721						
	DRAWING APPROVAL DATE 17 OCTOBER 1988								SHEET 1 OF 8										
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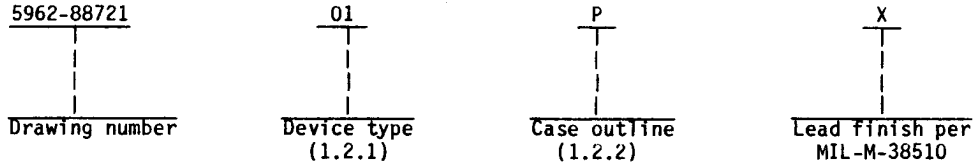
U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911
5962-E1024

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:



1.2.1 Device types. The device types shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	OP-270A	Dual, low-noise, precision, operational amplifier
02	OP-271A	Dual, low-noise, high-speed, operational amplifier

1.2.2 Case outlines. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

<u>Outline letter</u>	<u>Case outline</u>
P	D-4 (8-lead, .405" x .310" x .200"), dual-in-line package
2	C-2 (20 terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage (V_S)	- - - - -	±18 V
Differential input voltage	$\frac{1}{-}$ - - - - -	±1 V
Differential input current	$\frac{1}{-}$ - - - - -	±25 mA
Input voltage	- - - - -	Supply voltage
Output short-circuit	- - - - -	Continuous
Storage temperature range	- - - - -	-65°C to +150°C
Lead temperature (soldering, 60 seconds)	- - - - -	+300°C
Junction temperature (T_J)	- - - - -	+150°C
Thermal resistance (θ_{JC})	- - - - -	See MIL-M-38510, appendix C
Thermal resistance (θ_{JA}):		
Case P	- - - - -	45°C/W
Case 2	- - - - -	35°C/W

1.4 Recommended operating conditions

Supply voltage (V_S)	- - - - -	±15 V
Source resistance (R_S)	- - - - -	50Ω
Ambient operating temperature range (T_A)	- - - - -	-55°C to +125°C

1/ The inputs are protected by back-to-back diodes. Current limiting resistors are not used in order to achieve low noise performance. If the differential input voltage exceeds ±1.0 V, the input current should be limited to ±25 mA.

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2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full ambient operating temperature range.

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T _A < +125°C V _S = ±15V; R _S = 50Ω unless otherwise specified	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Input offset voltage	V _{IO}		01	1	75	μV	
				2,3	175		
			02	1	200		
				2,3	400		
Input offset current	I _{IO}	V _{CM} = 0 V	A11	1	10	nA	
				2,3	30		
Input bias current	I _B	V _{CM} = 0 V	A11	1	20	nA	
				2,3	60		
Input noise voltage	E _{nt}	f _o = 1 Hz to 100 Hz, T _A = +25°C	01	7	80	nV RMS	
Input noise voltage density 1/	e _n	f _o = 1 kHz, T _A = +25°C	02	7	11	nV/ √Hz	
Large-signal voltage gain	A _{VO}	V _O = ±10 V, R _L = 10 kΩ V _O = ±10 V, R _L = 2 kΩ V _O = ±10 V, R _L = 10 kΩ V _O = ±10 V, R _L = 2 kΩ	01	4	1500	V/mV	
				5,6	750		
			02	4	750		
				5,6	400		
				4	400		
				5,6	300		
Output voltage swing	V _O	R _L = 2 kΩ	A11	4,5,6	±12	V	
Average input offset voltage drift	TCV _{OS}	T _A = -55°C, +125°C	01	2,3	1.0	μV/°C	
			02	2,3	2.0		

See footnote at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C V _S = ±15 V; R _S = 50Ω unless otherwise specified	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Common-mode rejection	CMR	V _{CM} = ±12 V	A11	1	106		dB
				2,3	100		
Power-supply rejection ratio	PSRR	V _S = ±4.5 V to ±18 V	A11	1		3.2	μV/V
				2,3		5.6	
Supply current <u>2/</u>	I _{SY}	No load	A11	1		6.5	mA
				2,3		7.5	
Slew rate	SR	A _{VCL} = +20, R _L = 10 kΩ T _A = 25°C	01	7	±1.7		V/μs
			02		±5.5		

1/ Guaranteed if not tested to the limit specified.

2/ I_{SY} limit = total for both amplifiers.

3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) T_A = +125°C, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

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Device type	01, 02	
Case	P	2
Terminal number	Terminal symbol	
1	OUT A	NC
2	-IN A	OUT A
3	+IN A	NC
4	V-	NC
5	+IN B	-IN A
6	-IN B	NC
7	OUT B	+IN A
8	V+	NC
9		NC
10		V-
11		NC
12		+IN B
13		NC
14		NC
15		-IN B
16		NC
17		OUT B
18		NC
19		NC
20		V+

FIGURE 1. Terminal connections.

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4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with Method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 8, 9, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.

4.3.2 Groups C and D inspections.

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test conditions, method 1005 of MIL-STD-883:
 - (1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).
 - (2) $T_A = +125^{\circ}\text{C}$, minimum.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*,2,3,4,5,6
Group A test requirements (method 5005)	1,2,3,4,5,6,7
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

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5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number ^{1/}	Replacement military specification part number
5962-8872101PX	06665	OP-270AZ/883C	
5962-88721012X	06665	OP-270ARC/883C	
5962-8872102PX	06665	OP-271AZ/883C	
5962-88721022X	06665	OP-271ARC/883C	

^{1/} Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE number
06665

Vendor name and address

Precision Monolithics Incorporated
1500 Space Park Drive
P.O. Box 58020
Santa Clara, CA 95050

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